MAT 1339 A **Assignment 4** (Due DEC. 2nd, 11:30) **Student Number**:

Name:

Problem 1: Consider the line $[x, y, z] = [1, 2, 3] + t[5, 6, 7]$. (a) Is the point $R(3, 2, 1)$ on this line?

(b) Write the parametric equation of this line.

(c) Does the line $[x, y, z] = [-1, 2, -3] + s[0, 1, 2]$ intersect the line $[x, y, z] = [1, 2, 3] + t[5, 6, 7]$?

(d) Give a vector $[a, b, c]$ in the 3 space that is parallel to the line $[x, y, z] = [1, 2, 3] + t[5, 6, 7]$ and such that $a < 0$, $b < 0$ and $c < 0$.

Work:

Problem 2: Let $\overrightarrow{u} = [2, -1, 2]$ and $\overrightarrow{v} = [\frac{\sqrt{7}}{2\sqrt{5}}, \frac{\sqrt{7}}{\sqrt{5}}, \frac{3}{2}]$ be two vectors in three dimensional space.

(i) Find the angle between $\overrightarrow{u}$ and $\overrightarrow{v}$.

(ii) Find two unit vectors that are orthogonal to both $\overrightarrow{u}$ and $\overrightarrow{v}$.

Work:

Problem 3: Suppose that the volume of the parallelepiped defined by $\overrightarrow{u} = [1, 2, 3]$, $\overrightarrow{v} = [2, 3, 4]$, and $\overrightarrow{w} = [5, 6, x]$, is 1. Find all x.

Work:

Problem 4: Find the projection of $\overrightarrow{u} = [1, 2, 4]$ on $\overrightarrow{v} = [3, 1, 2]$.

Work:

Problem 5: Find the distance from the point $P = (1, 1, 6)$ to the line

$$x = 1 + t, \quad y = 3 - t, \quad z = 2t.$$

Work: